

Claims:

1. (currently amended) A method of communicating protection-signaling information between cards in a network element, the method comprising:
- receiving an incoming signal at a first card of a network element from over a network;
 - incorporating protection-signaling information obtained from the incoming signal into a first out-of-band signal;
 - transmitting the first out-of-band signal with the protection-signaling information incorporated therein from the first card to a second card in the network element over a link between the cards;
 - ~~aggregating protection signaling information obtained from out-of-band signals that are received by the second card from a plurality of cards;~~
 - obtaining, by the second card, the protection-signaling information from the first out-of-band signal;
 - incorporating, by the second card, the protection-signaling information obtained from the first out-of-band signal into a second out-of-band signal; and
 - simultaneously transmitting, from the second card to the first card and to plurality of one or more other cards in the network element, the second out-of-band signal having incorporated therein the aggregated protection-signaling information obtained from the first out-of-band signal.
2. (previously presented) The method of claim 10, wherein the first card and the third card are tributary cards.

- 1 3. (original) The method of claim 1, wherein the first card is a tributary
2 card and the second card is a cross-connect card.
- 1 4. (canceled)
- 1 5. (canceled)
- 1 6. (Currently amended) The method of claim 1, further comprising
2 receiving, by the first card, the second out-of-band signal having the
3 ~~aggregated~~ protection-signaling information ~~from the second card~~ and
4 determining which portion of the ~~aggregated protection signaling~~
5 ~~information~~ second out-of-band signal to process.
- 1 7. (original) The method of claim 1, wherein the protection signaling
2 information includes protection-switching protocol information.
- 1 8. (original) The method of claim 7, wherein the incoming signal is an
2 optical signal having a transport overhead, and the protection-switching
3 protocol information is carried by K1 and K2 bytes of the transport
4 overhead.
- 1 9. (previously presented) The method of claim 1, wherein each out-of-
2 band signal is a frame transmitted at a frame rate used for synchronous
3 data transmission of optical signals.
- 1 10. (Currently amended) The method of claim 1, further comprising
2 forwarding the protection-signaling information from the first card to a
3 third card located physically adjacent to the first card in the network
4 element over a second link different from the link used to carry the first
5 out-of-band signal between the first and second cards.

1 11. (Currently amended) A method of communicating protection-signaling
2 information between cards in a network element, the method comprising:
3 transmitting protection-signaling information from each of a
4 plurality of tributary cards in the network element to a cross-connect
5 card in the network element, each tributary card using an out-of-band
6 signal to carry the protection-signaling information from that tributary
7 card to the cross-connect card;
8 collecting, by the cross-connect card, the protection-signaling
9 information carried by the out-of-band signals that are transmitted
10 ~~obtained by the cross-connect card~~ from the plurality of tributary cards
11 to the cross-connect card;
12 incorporating the collected protection-signaling information into
13 a[n] new out-of-band signal; and
14 simultaneously transmitting the new out-of-band signal with the
15 collected protection-signaling information incorporated therein from the
16 cross-connect card to each tributary card in the plurality of tributary
17 cards in the network element; ~~and~~
18 ~~forwarding protection-signaling information from one of the~~
19 ~~plurality of tributary cards to an adjacent one of the plurality of tributary~~
20 ~~cards over a different link than a link used to carry the out of band~~
21 ~~signal.~~

1 12. (canceled)

1 13. (original) The method of claim 11, wherein the protection-signaling
2 information includes bytes K1 and K2 of a transport overhead of an
3 optical signal.

1 14. (Currently amended) A network element, comprising:
2 a backplane; and
3 a plurality of cards connected to the backplane, the plurality of
4 cards including a first card, a second card, and one or more other cards,
5 the second card being in communication over the backplane with the
6 first card and each other card of the plurality of cards, a first card
7 connected to the backplane, the first card receiving over a network an
8 incoming signal having protection-signaling information and
9 incorporating the protection-signaling information in a first out-of-band
10 signal₁;

11 ~~a second card connected to the backplane and in communication~~
12 ~~with the first card, the second card receiving the first out-of-band signal~~
13 ~~from the first card, obtaining the protection-signaling information from~~
14 ~~the first out-of-band signal, an incoming signal arriving at the second~~
15 ~~card from over a network, generating a second out-of-band signal having~~
16 ~~the obtained~~ with the protection-signaling information incorporated
17 therein, and simultaneously transmitting the second out-of-band signal
18 having the protection-signaling information to the first card and to each
19 other card of the plurality of cards in the network element

20 ~~wherein the first card receives out of band signals having~~
21 ~~protection signaling information from a plurality of cards, aggregates the~~
22 ~~protection signaling information in the received out of band signals, and~~
23 ~~simultaneously transmits the aggregated protection signaling~~
24 ~~information to the plurality of cards using the first out of band signal.~~

1 15. (Currently amended) The network element of claim 14, wherein the
2 first card is a ~~cross-connect~~ tributary card and the second card is a
3 ~~tributary-cross-connect~~ card.

1 16. (previously presented) The network element of claim 18, wherein the
2 first and third cards are tributary cards.

1 17. (canceled)

1 18. (Currently amended) The network element of claim 14, wherein the
2 plurality of cards includes further comprising a third card ~~connected to~~
3 in communication with the first card by a first link and ~~to~~ with the
4 second card by a second link, the third card receiving the protection-
5 signaling information in an out-of-band signal from the first card over
6 the first link and in an out-of-band signal from the second card over the
7 second link.

1 19. (previously presented) The network element of claim 14, wherein each
2 out-of-band signal is a frame transmitted at a frame rate used for
3 synchronous data transmission of optical signals.

1 20. (original) The method of claim 14, wherein the protection-signaling
2 information includes bytes K1 and K2 of a transport overhead of an
3 optical signal.

1 21. (new) The method of claim 1, further comprising:
2 receiving, by the second card, an out-of-band signal from each
3 other card, each out-of-band signal received from each other card having
4 protection-signaling information incorporated therein;
5 aggregating, by the second card, the protection-signaling
6 information obtained from the out-of-band signals received from each
7 other card; and
8 incorporating the aggregated protection-signaling information into

9 the second out-of-band signal together with the protection-signaling
10 information obtained from the first out-of-band signal.

1 22. (new) The method of claim 11, further comprising forwarding protection-
2 signaling information from a first one of the plurality of tributary cards to
3 a second one of the plurality of tributary cards over a link dedicated to
4 carrying out-of-band signals between the first and second tributary
5 cards, the first one of the tributary cards being located physically
6 adjacent the second one of the tributary cards in the network element.

1 23. (new) The network element of claim 14, wherein the second card receives
2 an out-of-band signal from each other card, each out-of-band signal
3 received from each other card having protection-signaling information
4 incorporated therein, the second card aggregating the protection-
5 signaling information obtained from the out-of-band signals received
6 from each other card and incorporating the aggregated protection-
7 signaling information into the second out-of-band signal together with
8 the protection-signaling information obtained from the first out-of-band
9 signal.